

REMARKS

By the present amendment, claims 1, 30 and 34 are pending in the application.

Claim Amendments

Claims 1, 30 and 34 have been amended to increase clarity of the previously claimed subject matter.

The term “repeatedly” appearing in the last paragraph of amended claims 1, 30 and 34 is disclosed in the specification, e.g., at page 20, lines 18-20.

The term “only part of” is disclosed in the specification, e.g., at page 26, line 29 - page 27, line 8 which discloses that when the number of conditions is very large only an important part of the information having a large influence is taken by the mathematical expression model.

§103

Claim 1, 30 and 34 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,216,593 to Dietrich et al.

This rejection, as applied to the amended claims, is respectfully traversed.

The Present Invention

The present invention, as explained in the response to the prior Office Action, links the structural elements such as the production simulator 100, the mathematical expression model 110, the optimization calculation device 120, the evaluation function S and the like as follows, as shown in the attached Fig. 1 (A).

(1). An initial state at the time of starting the schedule creation is sent to the production simulator 100. The initial state includes a period of creating the schedule, the starting time production state (charging, in-process product, inventory, operation state of equipment, etc.) and the like.

(2). Simulation with the production simulator 100 is started. The production simulator 100 creates the mathematical expression model 110 by acquiring elements (all the production state and production constraints may be included or only part of them may be taken) relating to the production schedule to be created, and the mathematical expression model 110 is held by the mathematical expression model holding device.

(3). The optimization calculation device 120 performs optimization calculation (linear programming, mixed integer programming, mathematical programming or the like is used) using the mathematical expression model 110 and the evaluation function S.

(4). The optimization calculation device 120 inputs the calculation result to the production simulator 100 as a production instruction for the production simulator 100.

(5). The time management part 101 in the production simulator 100 advances the event a step further according to production instructions.

(6). Taking a state that the event is advanced a step further as a starting state of next link processing, the production simulator 100 acquires elements relating to a production schedule to be created and creates the second mathematical expression model, and the mathematical expression model 110 is held by the mathematical expression model holding means.

(7). The optimization calculation device 120 performs the second optimization calculation using the mathematical expression model 110 and the evaluation function S.

(8). The optimization calculation device 120 inputs the second calculation result to the production simulator 100 as the second production instruction for the production simulator 100.

(9). The time management part 101 in the production simulator 100 advances the event a step according to the second production instruction.

These steps are related so far as a schedule creation time period (the number of occurrence times of the event that requires judgment). By this linking operation (repeating of the above-described processing (1) to (9)), it is possible to obtain a production simulation result at a high speed by performing only a one time of simulation without performing the simulation a plural times repeatedly. The result realizes a schedule executable making a desired evaluation index optimal for a large-scale production process under complicated production constraint conditions.

The present invention is not to execute simulation based on a conventional prescribed rule, but to execute simulation based on the result (production instruction) of optimization calculation for every event. Thus, it is possible to securely obtain a theoretical and optimal schedule by performing only one simulation.

Patentability

The cited reference (U.S. No. 5,216,592: Dietrich) is not provided with a production simulator that simulates a production process expressing a production state and a constraint of the production process and is not configured as a discrete system that moves a thing at each event as the present invention does. As a matter of course, the configuration of claims 1, 30 and 34 that “the production instruction obtained by the optimization calculation means is supplied to the production simulator to cause it to execute simulation, an instruction to create a mathematical expression model by acquiring all or only part of the production state and the production constraint and expressing in a mathematical expression and to perform optimization calculation is repeatedly outputted to said optimization calculation means from said production simulator when a new event requiring a production instruction

occurs, and thereby the production simulator and the optimization calculation means are linked to each other” is not disclosed or suggested at all by Dietrich.

The Office Action seems to consider that the “model generator 20” in Dietrich corresponds to the “production simulator” in the present invention. But the “model generator 20” of Dietrich is provided with a function only to perform “mathematically models”, but does not function as a simulator configured to be a discrete system that moves a thing at each event.

In Dietrich, there is a description that “an optimization model controller 23 updates the mathematical model based on the user’s input” (Col. 9, line 3 - 6), and a working loop of, input modification → calculation (modeling, optimization) → user evaluation, is executed (refer to attached Fig. 1 (B)). That is, in Dietrich, the successively simulating function and the optimization function are not linked at each event as in the present invention, only the optimization function statically solves problems collectively.

As described above, the present invention completely differs from the technology described in the cited reference (U.S. No. 5,216,593: Dietrich) in its configuration, operation and effect and is not disclosed or suggested by Dietrich.


It is therefore submitted that amended independent claims 1, 30 and 34 are patentable over U.S. Patent No. 5,216,593 to Dietrich et al.

CONCLUSION

It is submitted that in view of the present amendment and foregoing remarks, the application is now in condition for allowance. It is therefore respectfully requested that the application, as amended, be allowed and passed for issue.

Respectfully submitted,

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